IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of)	**AFTER FINAL**
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Keisuke Hashimoto et al.)	Group Art Unit: 2623
)	
Application No.: 09/408,366)	Examiner: Mehrdad Dastouri
)	
Filed: September 29, 1999)	Confirmation No.: 3976
)	
For: IMAGE-PROCESSING APPRATUS)	
)	

RESPONSE AFTER FINAL REJECTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Examiner is thanked for the careful examination of the application. However, in view of the following remarks, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejection.

Claims 1-3, 5-7, 10, 11, 15, 16, 18, and 19 have been rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,862,257, hereinafter *Sekine*, in view of U.S. Patent No. 5,486,927, hereinafter *Koizumi*. The Examiner alleges that *Sekine* discloses an edge judgment circuit which discriminates an edge direction of a target pixel from differences in the density level between the target pixel and adjacent pixels thereof based upon <u>multilevel</u> image data. In making the rejection, the Examiner recognizes that *Sekine* discloses that the image data is bilevel data, but argues that bilevel data should be considered as multilevel data since it includes two or more density values. However, contrary to the assertion of the Examiner, the terms "bilevel" and "multilevel" data are well established in the art, and are well known as different types of data. Note, for example, page 2, lines 16-

17, wherein bilevel image data and multilevel image data are distinguished in the same sentence. The Examiner's attention is also directed to a printout from the website of IT-EDUCTRA, wherein definitions for bilevel and multilevel data are set forth in section 14.4. According to the attached section, "bilevel" data refers to image data that has been digitized using only two amplitude levels, and "multilevel" data corresponds to image data that has been digitized using more than two amplitude levels. Accordingly, applicants submit that multilevel data is different than bilevel data, and is well understood in the art as including more than two amplitude levels. Accordingly, applicants submit that *Sekine* does not teach or suggest an edge judgment circuit which discriminates an edge direction of a target pixel from the density level of the target pixel and adjacent pixels thereof based on <u>multilevel</u> image data.

Furthermore, as acknowledged by the Examiner, the sub-pixels in *Sekine* are also bilevel, not multilevel, image data. Thus, *Sekine* also does not teach or suggest a density level determining circuit which determines <u>multilevel</u> density levels in a plurality of sub-pixels in the target pixel, where the target pixel is divided into the sub-pixels, in accordance with the density level of the target pixel and of the edge direction of the target pixel discriminated by the edge judgment circuit.

Furthermore, the Official Action is somewhat inconsistent in that at the top of page 3 of the Official Action, it is stated "Accordingly, *Sekine* et al alone disclose all limitations of Claim 1 by considering the dictionary definition of prefix 'multi' as 'two or more', that means a 'bi-level' density value is a 'multi-level' density value." However, at the same time on page 4, the Official Action indicates that " *Sekine* et al do not explicitly disclose determining multi-level density level in a plurality of sub-pixels in

the target pixel." Accordingly, the Examiner recognizes the difference between bilevel data and multilevel data, in spite of the argument thereof to the contrary.

Furthermore, the Examiner relies upon *Koizumi* as allegedly disclosing a digital image forming apparatus using subdivided pixels comprising a density level determining circuit which determines multilevel density levels in a plurality of sub-pixels in the target pixel. It is significant to note that the Examiner does not allege that *Koizumi* determines multilevel density levels in a plurality of sub-pixels based, at least in part, upon an edge direction of a target pixel. In fact, a review of the portions of *Koizumi* identified by the Examiner reveals that the density levels of the sub-pixels is determined by the formula set forth at the bottom of column 6, line 64, and by the formula set forth in column 11, line 12. Such formulas do not appear to take into account the edge direction of the target pixel which includes the sub-pixels.

The Office Action further alleges that it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the *Sekine* invention according to the teachings of *Koizumi* to determine multilevel density levels in a plurality of sub-pixels in the target pixel "because it will minimize jaggedness in the image boundaries and will enhance sharpness of the image." However, applicants strongly disagree with the Examiner's conclusion that it would have been obvious to so modify *Sekine*. First of all, the Examiner does not indicate how the teachings of *Sekine* would be modified to accommodate the multilevel image data of *Koizumi*. It is not enough for the Examiner to pick and choose arbitrary elements of the claims out of the prior art and combine them relying upon the teachings of the present application. The Examiner must find some motivation for making the proposed modification or combination.

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Furthermore, the manner in which bilevel image data is processed can be significantly different than the manner in which multilevel image data is processed, due to, among other things, the differences in size between the bilevel data and the multilevel data. Accordingly, it cannot be assumed that the apparatus of *Sekine* could be easily modified to accommodate multilevel image data. Furthermore, since it only creates bilevel data, *Sekine* would not have the capability of creating multilevel density levels in a plurality of sub-pixels. The process for creating multilevel data is similarly far more complex than that for creating bilevel data.

Accordingly, applicants submit that the two references are not properly combinable, as proposed by the Examiner.

Lastly, applicants reserve the right to challenge other details or aspects of the Examiner's analysis of the individual references, or the reasons for combining the references, at a later time if necessary and appropriate.

Accordingly, at least for the reasons set forth above, neither *Sekine*, nor *Koizumi*, nor the proposed combination thereof teach or suggest the subject matter of claim 1 which includes both the edge judgment circuit and the density level determining circuit, as discussed herein.

Claim 15 defines a method for processing multilevel image data and density levels of pixels, wherein a pixel is divided into a plurality of sub-pixels. The method includes the steps of discriminating an edge direction of a target pixel from differences in density level between the target pixel and adjacent pixels thereof based upon the multilevel image data, and determining multilevel density levels in a plurality of sub-pixels in the target pixel in accordance with the density level of the target pixel and the discriminated edge direction of the target pixel.

As set forth above with respect to claim 1, *Sekine* does not teach or suggest operations using multilevel density data. Accordingly, claim 15 is patentable over the applied prior art at least for the reasons set forth above with respect to claim 1.

Claim 19 defines an image processor which includes the edge judgment circuit and the density level determining circuit, similar to those set forth in claim 1, and further provides additional details of the density level determining circuit. Accordingly, claim 19 is also patentable over the applied prior art at least for the reasons set forth above with respect to claim 1.

Claims 2, 3, 5-7, 10, 11, 16, and 18 are dependent claims that depend from either claim 1 or claim 15, and are thus patentable over the applied prior art at least for the reasons set forth above with respect to claims 1 or 15. With regard to the dependent claims, applicants reserve the right to challenge the Examiner's analysis of the applied prior art with respect to the individual dependent claims at a later time if necessary and appropriate.

Claims 4, 8, 9, 12-14, 17, and 20 have been rejected under 35 U.S.C. §103(a) in view of *Sekine* in view of *Koizumi* and U.S. Patent No. 6,408,109, hereinafter *Silver*.

The Examiner relies upon *Silver* as allegedly disclosing an apparatus for detecting sub-pixel locations of edges in digital images comprising an edge direction detecting circuit that cancels the discriminated edge direction when the density level of a pixel adjacent to the target pixel in the edge direction is larger than a threshold value. However, claims 4, 8, 9, 12-14 and 17 depend from either claim 1 or claim 15. In addition, the teachings of *Silver* relied upon by the Examiner do not overcome the deficiency of the rejection set forth above with regard to claims 1 and 15.

Accordingly, Applicants submit that claims 4, 8, 9, 12-14, and 17 are patentable over the proposed combination at least for the reasons set forth above with respect to claims 1 and 15.

Furthermore, Applicants reserve the right to challenge the Examiner's analysis of *Silver*, and the alleged motivation for combining the three references at a later time, if necessary and appropriate.

Claim 20 defines an image processor which includes, among other elements, a density level determining circuit which determines density levels in a plurality of sub-pixels in a target pixel, wherein the density levels of the sub-pixels are determined in accordance with both the density level of the target pixel, as well as the edge direction of the target pixel. As set forth above, none of the references relied upon by the Examiner teach or suggest the use of at least the edge direction of the target pixel for determining density levels of a plurality of sub-pixels in the target pixel. Accordingly, the rejection of claim 20 is also improper and should be withdrawn.

In the event that there are any questions concerning this response, or the application in general, the Examiner is respectfully requested to reconsider and withdraw the outstanding rejections.

Respectfully submitted,

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Date: <u>May 18, 2004</u>

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